Chapter 7

Water Reuse Policies

RWSP water reuse policies provide guidance to King County on the development and implementation of its reclaimed water program. Producing and using reclaimed water can help reduce the volume of treated effluent discharged to Puget Sound. Reclaimed water is wastewater that is treated to such a high level it can be used safely and effectively for nondrinking purposes such as landscape and agricultural irrigation, heating and cooling, and industrial processing. Reclaimed water can also be used to enhance wetlands and help reduce withdrawals from streams and groundwater. The county's Wastewater Treatment Division (WTD) has been safely producing and using reclaimed water at its regional treatment plants (South plant in Renton and West Point plant in Seattle) since 1997.

The 15 water reuse policies provide direction on pursuing the use of reclaimed water, coordinating with regional water supply planning efforts, working with local water purveyors, preparing a reclaimed water feasibility study, and evaluating and implementing nonpotable water projects on a case-by-case basis. The policies call for the county to develop a water reuse public education program and provide guidance for this program to be coordinated with water conservation education programs. Some of the policies correspond to Washington State's Reclaimed Water Act (RCW 90.46), such as Water Reuse Policy (WRP)-10, which calls for the county to hold and maintain the exclusive right to any reclaimed water generated by the county's wastewater treatment plants. In addition, RWSP treatment plant policies direct the county to continue and to explore opportunities for expanded use of reclaimed water at existing plants and at all new treatment facilities and provide guidance on exploring the possible construction of satellite facilities to produce reclaimed water (Chapter 2).

This chapter provides an overview on implementation of the RWSP water reuse policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter includes a summary of the activities carried out in 2006 related to the county's reclaimed water program and water conservation efforts. This chapter concludes with information on amendments to the RWSP treatment plant policies adopted by the King County Council in 2004–2006.

The complete text of all the water reuse policies, including information on policy amendments and a summary of how each policy was implemented in 2004–2006, is provided in Appendix F.

7.1 Implementation of Water Reuse Policies from 2004 through 2006

The RWSP water reuse policies provide the foundation for King County's reclaimed water program. WTD's vision of creating resources from wastewater aligns closely with these policies. The division's reclaimed water efforts are also consistent with the 2006 King County Executive

orders to reduce global warming and the *King County 2007 Climate Plan*.[1,2] The executive orders and climate plan provide direction for the county to maximize the creation of resources from waste products in ways that both adapt to natural resource conditions impacted by global warming and mitigate impacts of global warming by reducing greenhouse gas emissions.

The Reclaimed Water Act of Washington State (RCW 90.46) recognizes the value of reclaimed water in the process to better manage, protect, and conserve our water resources. Measures to increase water conservation and expand the use of reclaimed water for non-potable uses are important elements in preparing for potential climate change impacts. Such measures can also assist in Puget Sound recovery efforts and in preparing for more stringent discharge regulations that could occur in the future.

This section provides an overview of the major activities and efforts carried out in 2004–2006 in accordance with the RWSP water reuse policies. The activities are as follows:

- Producing and using reclaimed water at South and West Point plants
- Planning for reclaimed water at the Carnation and Brightwater plants
- Preparing a reclaimed water feasibility study
- Working with local agencies in reclaimed water planning efforts
- Carrying out reclaimed water and water conservation education activities

7.1.1 Reclaimed Water Opportunities at South and West Point Plants

The RWSP treatment plant policies encourage King County to continue water reuse and explore opportunities for expanded use at its existing plants. At the same time, the water reuse policies provide direction to ensure that the reclaimed water is used in a manner that protects public health and the environment.

WTD has been safely using reclaimed water since 1997 at the South and West Point plants. Annually, these plants use about 255 million gallons of reclaimed water for landscape irrigation, internal plant reuse, and other non-drinking purposes. King County's reclaimed water meets strict Class A standards set by the Washington State Departments of Health and Ecology.[3]

At West Point plant, about 173 million gallons are used for on-site processes and irrigation. At South plant, about 82 million gallons are used for on-site processes and irrigation and for irrigation of nearby sports fields at the City of Tukwila's Fort Dent Park, a wetland plant nursery,

[1] The executive orders to reduce global warming (PUT 7-5 to 7-8 [AEO]) are available at http://www.metrokc.gov/recelec/archives/sysindex.htm

[2] The *King County 2007 Climate Plan* is available at http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf

[3] Class A reclaimed water is reclaimed water that, at a minimum, is at all times an oxidized, coagulated, filtered, and disinfected wastewater. Allowed end uses of Class A reclaimed water are irrigation of food and non-food crops and irrigation of open access areas, such as parks. The water could also be used for industrial cooling and process water and other non-drinking-water (non-potable) uses.

and habitat restoration efforts. The county is exploring additional uses for reclaimed water from South plant with some of the cities near the plant.

Installation of a greenhouse began in early 2007 at the South Treatment Plant as part of the county's resource recovery program. The greenhouse will showcase the safe use of reclaimed water and biosolids compost in growing ornamental and horticultural plants. Researchers from the University of Washington will be able to use the greenhouse for on-site studies involving reclaimed water and biosolids. Much of their research will focus on answering questions from current and future customers of reclaimed water and will use water from South Plant's sand filters and from membrane bioreactor systems.

Studies currently under way include:

- Effects of reclaimed water on growth of golf course turfgrasses
- Fate and degradation of various organic compounds (pharmaceutical, anti-microbial, and estrogenic compounds) in soil irrigated with reclaimed water and in soil amended with biosolids.

The research will also help to fine-tune operational practices.

7.1.2 Moving Forward on Reclaimed Water Opportunities at the Carnation and Brightwater Treatment Plants

The RWSP treatment plant policies direct the county to explore reclaimed water opportunities at all new treatment plants. The Brightwater and Carnation treatment plants will use membrane bioreactor technology (MBR), which provides better and more consistent overall treatment than conventional activated sludge secondary treatment. The technology results in treated wastewater (effluent) that is seven to ten times cleaner than typical secondary treated wastewater. In addition, MBR systems can produce Class A reclaimed water. As a result, King County has looked for opportunities to combine reclaimed water during the construction of the conveyance systems associated with these projects.

Carnation Treatment Plant Wetland Enhancement

When operational, reclaimed water from the Carnation Treatment Plant will be used to enhance a wetland in the Chinook Bend Natural Area. King County is partnering with Ducks Unlimited, a nonprofit organization dedicated to wetland conservation, to design the wetland discharge project. In summer 2005, the county and Ducks Unlimited worked with the Snoqualmie Tribe and other interested stakeholders to develop a design for the wetland. The wetland design focuses on enhancing native plantings and controlling reed canary grass through the use of a water control structure, which allows for moist soil management and for fish passage. The design includes removing an existing culvert and pipe system that currently drains the existing degraded wetland, installing a new water control structure, and daylighting the water flowing out of the wetland. The design will increase the size of the wetland to nearly four acres, benefiting wildlife and enhancing opportunities for passive recreation at Chinook Bend (Figure 7-2).

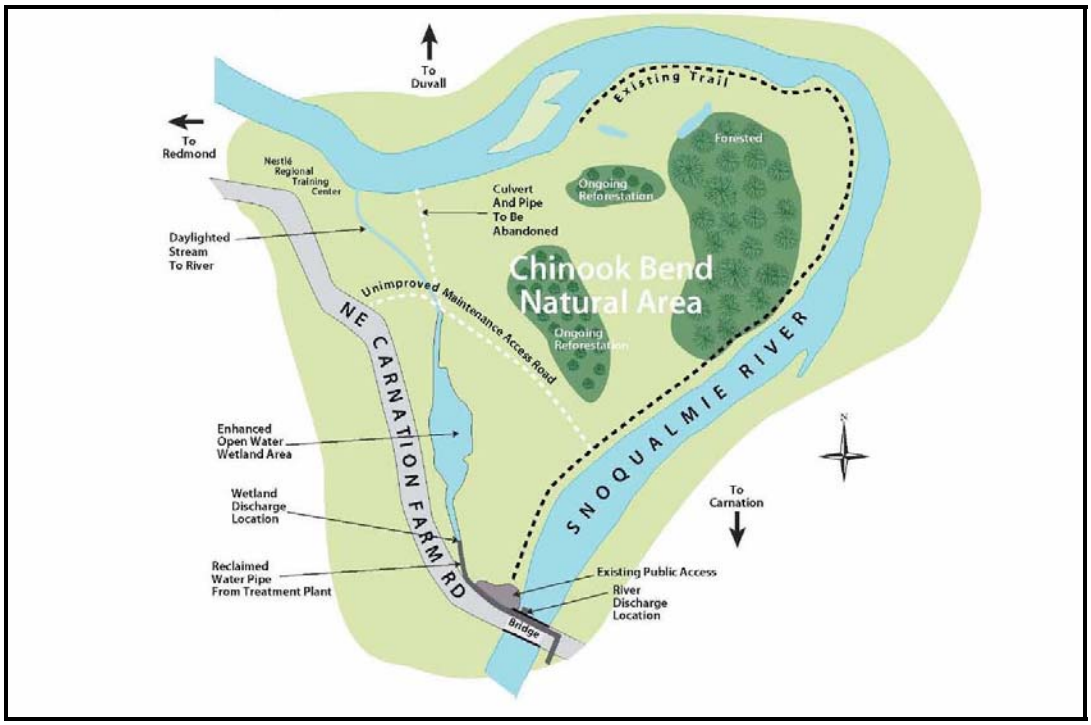

Figure 7-1. Conceptual enhancement of the Chinook Bend Natural Area

Construction of the wetland is scheduled to begin in the second half of 2007. The treatment plant is expected to come online in the first half of 2008. During startup, treated water from the plant will be discharged via the plant's outfall to the Snoqualmie River. After startup is complete, the wetland will become the primary discharge location for reclaimed water. The river outfall will remain operational and serve as a backup to the wetland when maintenance or equipment problems prevent the facility from producing reclaimed water. In such cases, highly treated water that meets or exceeds river discharge standards would be discharged via the outfall. Information on the Carnation Treatment Plant is also provided in Chapter 2.

Brightwater Reclaimed Water Backbone

As reported in the *RWSP 2004 Annual Report*, development of the Sammamish Valley Reclaimed Water Production Facility was cancelled in late 2003 in favor of developing capabilities of the Brightwater system to produce and distribute reclaimed water. Reclaimed water from Brightwater will provide a greater quantity of reclaimed water at lower cost. King County started predesign work in 2004 to distribute reclaimed water to communities along the Brightwater Treatment Plant's effluent pipeline and to the Sammamish Valley. State regulators advised the county that using the Brightwater effluent pipeline to convey reclaimed water would limit the water's usefulness because it would not meet Class A reclaimed water standards at all times without further treatment. In response, a decision was made to add an additional 27-inch diameter pipe for reclaimed water within the Brightwater conveyance effluent tunnel between the Brightwater plant and the Influent Pump Station (IPS) in Bothell.

In early 2005, the county determined that adding an additional pipe for reclaimed water within the Brightwater effluent tunnel west of Bothell would be more cost-effective in the long term than additional small tertiary treatment plants along the effluent tunnel route. Staff from King County's Department of Natural Resources and Parks provided briefings to King County Council members, the Regional Water Quality Committee, the Metropolitan Abatement Advisory Committee (MWPAAC), and other stakeholders about the opportunity to distribute reclaimed water from Brightwater, referred to as the Brightwater reclaimed water "backbone". In addition, in November 2005, the Washington State Department of Ecology (Ecology) reiterated its support of the backbone as part of the state and region's water resource management strategy.

WTD issued a draft white paper on the Brightwater backbone in fall 2005 and updated it in spring 2006.[4] The paper provides information about the opportunity to build the backbone in conjunction with the construction of Brightwater conveyance, reclaimed water quality, and results of a preliminary reclaimed water rate and revenue analysis and impacts to monthly sewer rates. The paper also includes responses to questions and concerns raised by MWPAAC and Seattle Public Utilities and letters, articles, and publications that support the county's reclaimed water efforts.

To keep costs down, the Brightwater backbone takes advantage of existing infrastructure and planned construction. In addition to including reclaimed water pipes in the Brightwater tunnels while the tunnels are being built, an existing pipeline is being converted to carry reclaimed water from Bothell to the York Pump Station in the Sammamish Valley.

In November 2005, the King County Council approved Phase 1 of the Brightwater reclaimed water backbone as part of WTD's 2006 budget. Phase 1 involves construction of the backbone segments—the South Segment (Sammamish Valley) and the West Segment. The South Segment includes connecting the Brightwater IPS to the North Creek force main and construction of approximately 10,000 feet of purple pipe from the York Pump Station to points in the Sammamish Valley.[5] It will provide up to 7 million gallons per day (mgd) of reclaimed water to customers beginning in 2011. Potential reclaimed water opportunities from this segment include uses for parks and businesses in Bothell, Woodinville, Redmond, and other cities in the area, as well as farms, parks, and businesses in the Sammamish Valley. In addition, the county has an agreement with Willows Run Golf Course to supply the golf course with reclaimed water from this portion of the backbone. Figure 7-2 depicts the locations of the Brightwater reclaimed water system.

The West Segment consists of dedicated, concrete-encased 27-inch diameter reclaimed water pipes within the Brightwater effluent tunnel that runs from the IPS in Bothell to the Ballinger Way Portal in Shoreline. Additional infrastructure is required before access to reclaimed water from this segment is available; such infrastructure will not be built until demand is demonstrated. When the entire reclaimed water pipeline and associated infrastructure are constructed and operational, 21 mgd of reclaimed water will be available.

[4] *Draft White Paper, Reclaimed Water Backbone Project*, version 3, March 2006, is available through the Wastewater Treatment Division of King County's Department of Natural Resources and Parks

[5] Reclaimed water is distributed through a separate set of purple pipes which helps guarantee reclaimed water and drinking water supplies are never mixed. Purple is the nationally designated color for marking reclaimed water pipes, hoses, pumps, and other equipment.

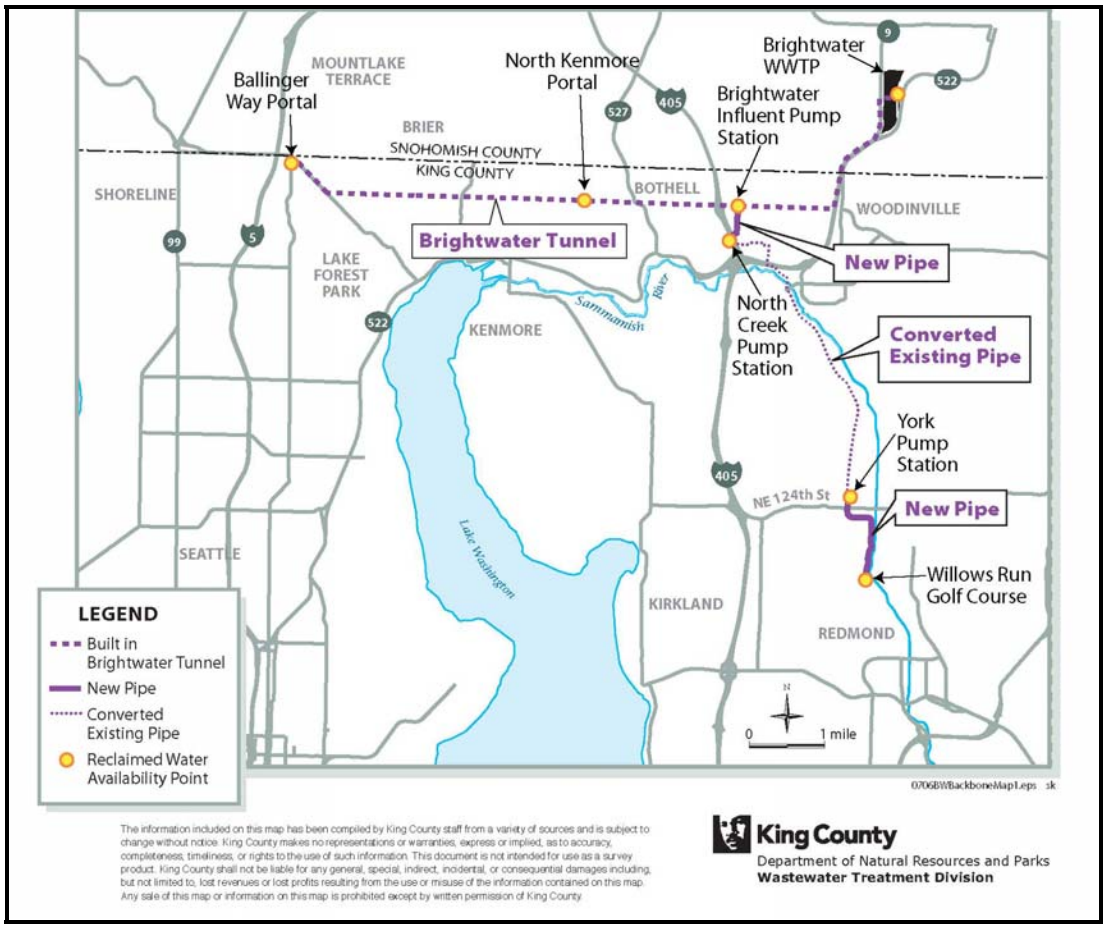

Figure 7-2. Brightwater Reclaimed Water System

In 2006, design was completed on the backbone and construction bids were advertised for the reclaimed water pipeline from the Brightwater IPS to the North Creek Pump Station. Design was also initiated on converting the existing pipelines from the North Creek Pump Station to the York Pump Station and on the final section of new reclaimed water purple pipe from the York Pump Station to Willows Run Golf Course. The *Brightwater Reclaimed Water Engineering Report* was approved by the Washington State Department of Health (DOH) on October 31, 2006 and by Ecology on November 8, 2006. WTD continues to work with DOH and Ecology to ensure the design and construction of the backbone complies with state standards.

Implementation of the reclaimed water backbone will help meet the Washington State Department of Natural Resources' Aquatic Land Use Authorization for the Brightwater outfall. This authorization stipulates that the county document progress made to limit discharges to Puget Sound in every NPDES (National Pollutant Discharge Elimination System) permit renewal application process, which occurs about every five years.

King County is working with cities, districts, and businesses to identify potential Brightwater reclaimed water users. In addition, the county will continue to work with its component agencies to address concerns raised during the development of the backbone; these concerns focused on issues of who pays for and who benefits from reclaimed water. Some of the agencies also

expressed concern about their potential loss of water customers and stranded costs. As stated in the Brightwater backbone white paper, the county's preference is to act as a wholesale supplier of reclaimed water to the cities or districts; the cities or districts would then retail the water to the users in their water service area.

The county is also continuing efforts to identify additional funding sources for the project. The Washington State Public Works Board awarded a $1 million low-interest loan in spring 2006 to help with the preconstruction costs of building the reclaimed water system.

For more information, visit the Brightwater Reclaimed Water System Web site: http://dnr.metrokc.gov/wtd/reuse/brightwater/index.htm

7.1.3 Preparing a Reclaimed Water Feasibility Study

In response to a Regional Water Quality Committee recommendation, RWSP Water Reuse Policy (WRP)-2 was amended via Ordinance 15602, which was adopted by the King County Council on September 25, 2006. The amended policy replaced the directive for a reclaimed water work program—which the executive submitted in December 2000 in accordance with WRP-2 as adopted in 1999—with the directive for preparation of a reclaimed water feasibility study by December 2007. The complete text of the amended policy is as follows:

> **WRP-2**: By December 2007, the King County executive shall prepare for review by council a reclaimed water feasibility study as part of a regional water supply plan which will include a comprehensive financial business plan including tasks and schedule for the development of a water reuse program and a process to coordinate with affected tribal and local governments, the state and area citizens. The reclaimed water feasibility study shall be reviewed by the RWQC. At a minimum the feasibility study shall comply with chapter 90.46 RCW and include:
>
> 1. Review of new technologies for feasibility and cost effectiveness, that may be applicable for future wastewater planning;
> 2. Review of revenue sources other than the wastewater rate for distribution of reused water;
> 3. Detailed review and an update of a regional market analysis for reused water;
> 4. Review of possible environmental benefits of reused water; and
> 5. Review of regional benefits of reused water.

Although a regional water supply plan has not been developed, WTD is proceeding with the work of the feasibility study to meet the December 2007 deadline. Activities in late 2006 focused on selecting a consultant for the study; a Notice to Proceed was issued in late February 2007.

Activities under way to complete the feasibility study are as follows:

- **Scope of work.** The county worked with the selected consultant to develop and finalize a scope of work; comments and input from the MWPAAC's Engineering and Planning Subcommittee were considered during the development of the scope of work.
- **Focus groups.** A series of focus groups targeted toward park users, business organizations, and agricultural interests were held in 2007. Information gathered from the park users groups focused on issues related to acceptability of using reclaimed water in

parks; economic issues were the focus for the business organizations; and questions related to end user and customer concerns were the focus of the agricultural interests groups.

- **Meetings with cities and water and sewer districts.** WTD staff is meeting with cities and water and sewer districts in the county's wastewater service area to gather information for the feasibility study. The cities and districts will have the opportunity to share their views on the benefits and drawbacks of reclaimed water, provide information on their current and anticipated needs related to reclaimed water, and discuss factors that would influence their decision to use reclaimed water. The meetings will also help to identify potential users of reclaimed water and any other issues that the cities and districts would like the county to consider as it moves forward with its reclaimed water program.

In addition, the county is reviewing information on reclaimed water programs in the State of Washington, identifying potential uses for reclaimed water in the county's service area, reviewing potential funding and cost recovery options, and using the WateReuse Foundation's Economic Framework to evaluate the benefits and costs of the county's reclaimed water program.[6]

The focus of the feasibility study is on the county's reclaimed water program as a whole; it will not provide an evaluation of specific reclaimed water projects. Proposals for new major reclaimed water projects will be evaluated on a case-by-case basis in accordance with the direction provided in RWSP policy WRP-5 (see Appendix F).

7.1.4 Working with Local Agencies in Reclaimed Water Planning Efforts

The water reuse policies call for the county to work with local water purveyors regarding opportunities for reclaimed water. WTD participates in ongoing discussions with individual purveyors, jurisdictions, MWPAAC, and other entities concerning reclaimed water opportunities.

The Brightwater mitigation agreements with the City of Bothell, City of Kenmore, and the Cross Valley Water District discuss pursuing opportunities for using reclaimed water. The February 2005 *Memorandum of Understanding on Water Resource and Supply Planning Between Cascade Water Alliance and King County* also includes discussion on potential reclaimed water opportunities. The meetings taking place in preparation of the reclaimed water feasibility study provide another example of how the county is working with local agencies on reclaimed water efforts.

In addition, in 2005, WTD participated in the Reclaimed Water Technical Committee of the Regional Water Supply Planning process. The purpose of the planning process is to identify, compile information on, and discuss many of the key issues that relate to or may affect water resources of the region. The goal of this process is to develop the best available data,

[6] The WateReuse Foundation is an educational, nonprofit public benefit corporation that serves as a centralized organization for the water and wastewater community to advance the science of water reuse, recycling, reclamation, and desalination. More information is available at http://www.watereuse.org/Foundation/index.html.

information, and pragmatic tools that participants may use, at their discretion, to assist in the management of their respective water systems and resources and in their water supply planning activities. The Reclaimed Water Technical Committee was composed of representatives from local jurisdictions, water and sewer districts, regional water associations, and the DOH and Ecology. The committee reviewed reclaimed water analysis tools and maps of potential areas for reclaimed water use during their meetings in 2006. More information on the Regional Water Supply Planning Process is available at http://www.govlink.org/regional-water-planning/index.htm

King County was a co-sponsor of the June 2007 Reclaimed Water Workshop that was sponsored by the Pacific Northwest Clean Water Association. Other co-sponsors included the Puget Sound Action Team, DOH, Ecology, and the WateReuse Association. Representatives from tribal governments, cities and special purpose districts, regulatory agencies, and other groups attended this sold-out statewide conference. During the conference, state and local leaders, including the King County Executive, signed a formal declaration of support for the continued development and use of reclaimed water in communities throughout Washington. Many different environmental organizations have subsequently signed the declaration.

In 2006, the Washington State Legislature amended the Reclaimed Water Act (Chapter 90.46 RCW). The amendments direct Ecology to form an advisory committee and to adopt rules for all aspects of reclaimed water use by December 31, 2010. King County's Department of Natural Resources and Parks (DNRP) is a member of this advisory committee. The committee includes a broad range of interested parties representing various stakeholder groups, including those potentially affected by the rule and those with technical expertise and knowledge of new advancements in technology. More information on the advisory committee is available at http://www.ecy.wa.gov/Programs/wq/reclaim/rule_develpmnt.html

King County Code 13.24.010 calls for water comprehensive plans to include an evaluation of reclaimed water opportunities as required by RCW 90.46.120 and for sewer comprehensive plans to consider opportunities for reclaimed water as required under RCW 90.48.112. King County's Utilities and Technical Review Committee serves as the technical review body for county water and sewer utilities' comprehensive plans.

7.1.5 Reclaimed Water and Water Conservation Public Education Activities

King County has an ongoing reclaimed water and water conservation public education program. In 2004–2006, written materials on reclaimed water and water conservation were developed for a variety of audiences, from large water users to the general public. Information on reclaimed water is included in tours and open houses of the county's regional treatment plants. The greenhouse demonstration project at South plant will be a part of plant tours as well. Informational displays on reclaimed water are available for public meetings and events.

WTD's reclaimed water and water conservation Web sites are available to the public and are updated on a regular basis (http://dnr.metrokc.gov/wtd/reuse/index.htm and http://dnr.metrokc.gov/wtd/waterconservation/index.htm). The Web sites include contact

information for submitting questions or requesting additional information on reclaimed water and water conservation.

Since 2005, reclaimed water issues have been incorporated into DNRP's annual water quality survey. Questions were included about specific potential uses for reclaimed water to help identify potential markets for reclaimed water and identify the benefits, concerns, and educational needs concerning reclaimed water. In the 2005 and 2006 surveys, over 82 percent of the respondents said that the county should use as much reclaimed water as possible. DNRP plans to include questions on reclaimed water in future annual water quality surveys.

More information on WTD's public involvement programs is provided in the Public Involvement Policies Chapter (Chapter 12).

7.2 Reclaimed Water Activities in 2006

Key achievements of the reclaimed water program in 2006 are as follows:

- Produced about 255 million gallons of reclaimed water at West Point and South plants; some of the reclaimed water from South plant was used as an irrigation source for sports fields at Fort Dent Park, a wetland park nursery, and habitat restoration efforts
- Completed design of the Carnation Treatment Plant's wetland discharge project
- Updated the draft white paper on the Brightwater backbone in March 2006
- Advertised construction bids for the Brightwater backbone
- Completed design on the Brightwater reclaimed water pipeline
- Received DOH and Ecology approval of the *Brightwater Reclaimed Water Engineering Report*
- Selected a consultant for work associated with the reclaimed water feasibility study
- Participated in the Reclaimed Water Technical Committee of the Regional Water Supply Planning Process
- Served as a co-sponsor of the June 2007 Reclaimed Water Workshop
- Met with representatives from local jurisdictions, water and sewer districts, parks, and businesses to discuss reclaimed water opportunities

7.3 Amendments to Water Reuse Policies

In September 2006, the King County Council approved amendments to the RWSP water reuse policies via adoption of Ordinance 15602. The amendments are as follows:

- Replaced the word "accelerate" with "facilitate" in this sentence within WRP-1: *The county shall facilitate the development of a water reuse program to help meet the goals of the county to preserve water supplies within the region and to ensure that any reclaimed*

water reintroduced into the environment will protect the water quality of the receiving water body and the aquatic environment.

- Replaced the directive in WRP-2 for a reclaimed water work program—which the executive submitted to the King County Council in December 2000—with the directive for a reclaimed water feasibility study as part of a regional water supply plan.
- Added the word "future" to WRP-3: *Recycling and reusing reclaimed water shall be investigated as a possible future significant new source of water to enhance or maintain fish runs, supply additional water for the region's nonpotable uses, preserve environmental and aesthetic values and defer the need to develop new potable water supply projects.*
- Amended WRP-4 to ensure coordination of reclaimed water projects is carried out with affected water supply purveyors.
- Amended WRP-5 to further define the criteria to be used to evaluate nonpotable reuse projects, the elements to be included in project financial analysis, and to require new water reuse projects that require major capital funding be reviewed by RWQC and approved by the King County Council.
- Replaced the word "fund" in WRP-13 with "evaluate potential funding" and deleted the word "demonstration", which preceded "water reuse projects"; the policy now reads: *King County shall continue to evaluate potential funding of pilot-scale and water reuse projects, in whole or in part, from the wastewater utility rate base.*